Remarks

Claims 15, 17, 19, 20, 22 and 25-28 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Call (US 5,309,461) in view of Kimbrough (US 6,707,833). Claim 18 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Call in view of Kimbrough and further in view of Sakamoto (US 5,005,164).

The above rejections are respectfully traversed and submitted to be inapplicable to the claims for the following reasons.

Claim 15 is patentable over the combination of Call and Kimbrough, since claim 15 recites a semiconductor laser driving device including, in part, a high-frequency superimposing circuit for superimposing a high-frequency signal over a driving signal for a semiconductor laser, and a high-frequency superimposing control section for controlling an amplitude of the high-frequency signal, wherein the high-frequency superimposing control section is operable to control the amplitude such that a peak-to-average ratio that is a ratio of a peak value of an electric signal corresponding to a light amount of light from the semiconductor laser with respect to an average value of the electric signal does not increase above a first reference value. The combination of Call and Kimbrough fails to disclose or suggest the high-frequency superimposing control section as recited in claim 15.

Call discloses a feedback system for controlling a laser 14. The feedback system includes a photodiode 31 that receives an auxiliary beam from the laser 14 and outputs a photo-current amplitude corresponding to the light power of the auxiliary beam. A laser control 15 receives the photo-current amplitude from the photodiode 31 and uses the photo-current amplitude to control the laser 14 so as to maintain predetermined light intensity values. (See column 3, lines 35-48 and Figure 1).

Further, Call discloses that semiconductor lasers are sensitive to laser light feedback which changes the output laser power and increases laser noise. In order to limit laser light feedback, it is possible to modulate the laser with a high frequency signal, such that the laser is turned off when it receives reflected light and turned back on once the reflected light has passed. However, the modulation depth must be controlled to adequately control laser noise. (See column 3, lines 48-61).

Based on the above discussion, it is apparent that Call does disclose that controlling the modulation depth of a laser can be used to reduce laser noise. However, as admitted in the

rejection, Call fails to disclose or suggest controlling an amplitude of a high-frequency signal such that a peak-to-average ratio that is a ratio of a peak value of an electric signal corresponding to a light amount of light from a semiconductor laser with respect to an average value of the electric signal does not increase above a first reference value. As a result, Kimbrough is relied upon as disclosing this feature.

Regarding Kimbrough, it discloses a digital laser diode circuit 130 including a back-facet photodiode 66B for monitoring light emitted from a semiconductor laser 66F which is controlled by a driver circuit 30, a digital feedback loop 40 and an analog feedback loop 50. The digital feedback loop 40 is used to monitor the peak power level of the photodiode 66B. The analog feedback loop 50, which is different than the digital feedback loop 40, is used to monitor the average power level of the photodiode 66B. (See column 2, line 57 – column 3, line 53 and Fig. 3).

In the digital feedback loop 40, an upper limit value and a lower limit value based on a reference voltage V_R from a PWM signal 210 are compared with the peak-power of the photodiode 66B. The result of the comparison between the upper limit and the lower limit value is outputted to a synthesizer 60 which controls a high frequency signal. The analog feedback loop 50, on the other hand, controls a current value for driving a laser drive transistor 62 in such a manner that the reference voltage V_R becomes equal to the average power of the photodiode 66B (See column 3, line 54 – column 4, line 31).

Based on the above discussion, it is apparent that in Kimbrough, the average power and the peak power are separately controlled in such a manner that the average power is equal to the reference voltage V_R, and the peak power is in the range between the upper limit value and the lower limit value based on the reference voltage V_R. As a result, when the output from the semiconductor laser 66F varies, the peak power cannot be controlled appropriately in response to a variation of the average power.

On the other hand, according to the present invention as recited in claim 15, even when the output from the semiconductor laser varies, the high-frequency superimposing control section controls the amplitude based on the peak-to-average ratio. Thus, the peak power can be controlled appropriately in response to a variation of the average value. Kimbrough fails to disclose or suggest the controlling of amplitude such that a peak-to-average ratio that is a ratio of a peak value of an electric signal with respect to an average value of the electric signal does not

increase above a given reference value, as recited in claim 15 of the present invention. Therefore, Kimbrough fails to address the deficiency of Call. As a result, the combination of Call and Kimbrough fails to render claim 15 obvious.

Regard Sakamoto, it is relied upon as disclosing a temperature sensor and a storing section. However, Sakamoto fails to disclose or suggest the high-frequency superimposing control section of claim 15.

Because of the above-mentioned distinctions, it is believed clear that claims 15, 17, 19, 20, 22 and 25-28 are allowable over the reference relied upon in the rejections. Furthermore, it is submitted that the distinctions are such that a person having ordinary skill in the art at the time of invention would not have been motivated to make any combination of the references of record in such a manner as to result in, or otherwise render obvious, the present invention as recited in claims 15, 17, 19, 20, 22 and 25-28. Therefore, it is submitted that claims 15, 17, 19, 20, 22 and 25-28 are clearly allowable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. The Examiner is invited to contact the undersigned by telephone if it is felt that there are issues remaining which must be resolved before allowance of the application.

Respectfully submitted,

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